

REMARKS/ARGUMENTS

Claims 1-20 are pending. Claims 1-20 have been rejected under 35 U.S.C 102(e) as being anticipated by U.S. Pat. No. 6,541,815 to *Mandelman et al.* Applicants respectfully traverse the Examiner's rejections, noting that the cited reference does not disclose every element of claims 1-20. For example, the cited reference does not disclose a channel region having a first portion that is along the surface adjacent to the first region, a first gate electrode on a dielectric spaced apart from the first portion of the channel region, or forming a second gate electrode.

Mandelman discloses a memory cell element having an L-shaped floating gate that partially overlaps a program line in the bottom of a trench, and a control gate located in the trench that is capacitively coupled to the L-shaped floating gate. (i.e., *Mandelman*, col. 4, lines 3-13). In particular, *Mandelman* discloses a channel region located along the sidewall of the trench consisting of an upper portion coupled to the control gate and a lower portion coupled to the L-shaped floating gate. (*Mandelman*, Fig. 1, Fig 16B). In operation, the *Mandelman* memory cell is controlled by applying voltage to the control gate, bitlines, and program lines to cause electron injection, tunneling, or current flow in the channel region perpendicular to the surface of the substrate or in the trench. For example, during erasure electrons tunnel from the L-shaped floating gate to the control gate in the trench (*Mandelman*, Fig. 2A; col. 4, lines 31-32); during programming electrons are injected from the bitline to the L-shaped floating-gate in the channel region along the sidewall (Fig. 2B; col. 4, lines 49-51); during a read operation a path is formed in the channel region along the sidewall to determine a 'low' state (Fig. 2C, col. 5, lines 5-8). In other words, *Mandelman* discloses a memory cell having *only a control gate and L-shaped floating gate*, and a *channel region located along the sidewall of the trench that is perpendicular to the surface*.

In contrast, claim 1 recites a non-volatile memory cell comprising *a channel region having a first portion wherein the first portion is along the surface* adjacent to the first region,

wherein the surface is substantially planar. Similarly, claim 6 recites an array of non-volatile memory cells, each of the non-volatile memory cells comprising *a channel region having a first portion wherein the first portion is along the surface* adjacent to the first region, wherein the surface is substantially planar. As previously described, *Mandelman* does not disclose this element of the claims. *Mandelman* only discloses a channel region that is perpendicular to the surface. Moreover, *Mandelman* fails to disclose any movement of charges along the surface, even during operation of the device. Thus, for at least this reason, it is respectfully submitted that claim 1 and claim 6 are patentable over the cited reference and are in condition for allowance.

Furthermore, claim 1 and claim 6 additionally recite that the non-volatile memory cell comprises *a first gate electrode spaced apart from the first portion of the channel region*. In contrast, *Mandelman* discloses a control gate and an L-shaped floating gate in a trench spaced apart from a channel region that is perpendicular to the surface. *Mandelman* does not disclose a first gate electrode spaced apart from the first portion, wherein the first portion is along the surface. Therefore, it is respectfully submitted that claim 1 and claim 6 are patentable over the cited reference for at least this additional reason and are in condition for allowance.

Claim 12 recites a method of manufacturing an array of non-volatile memory cells, the formation of each memory cell including *forming a second gate electrode spaced apart from the surface* between the second region and the trench, wherein the surface is substantially planar. Similarly, claim 17 recites a method of manufacturing a non-volatile memory cell comprising *forming a second gate electrode spaced apart from the surface* between the second region and the trench. As previously described, *Mandelman* discloses forming a control gate and an L-shaped floating gate in a trench spaced apart from a channel region that is perpendicular to the surface. *Mandelman* does not disclose forming a second gate electrode spaced apart from the surface, wherein the surface is substantially planar. Therefore, it is respectfully submitted that

claim 12 and claim 17 are patentable over the cited reference for at least this reason and are in condition for allowance.

In addition, claim 12 and claim 17 further recite *forming a floating gate in the trench, forming a first gate electrode in the trench, and forming a second gate electrode spaced apart from the surface*. In contrast, *Mandelman* does not disclose forming a second gate electrode. (i.e., *Mandelman*, col. 7, lines 13-22 (L-shaped floating gate in the trench); col. 8, lines 44-49 (control gate in the trench)). Therefore, it is respectfully submitted that claim 12 and claim 17 are patentable over the cited reference for at least this reason and are in condition for allowance.

Furthermore, it is respectfully submitted that claims 2-5 which depend from claim 1 are in condition for allowance for at least the same reason that claim 1 is in condition for allowance. Similarly, claims 7-11 which depend from claim 6, claims 13-16 which depend from claim 12, and claims 18-20 which depend from claim 17, are in condition for allowance for at least the same reasons that each respective base claim is in condition for allowance.

For the foregoing reasons, it is respectfully submitted that the claims are in an allowable form, and action to that end is respectfully requested.


The Examiner is invited to call Applicants' attorney at the number below in order to expedite prosecution of this application.

The Commissioner is authorized to charge any deficiencies in fees and credit any overpayment of fees to **Deposit Account No. 07-1896** and reference Attorney Docket **No. 351913-992471**.

Respectfully submitted,

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Dated: 23 Nov. '05

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